

SOME ACUARIINAE (NEMATODA) FROM AUSTRALIAN BIRDS

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Summary

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Two new genera are proposed: *Willmoitia*, for *W. australis* n.sp., from *Malurus cyaneus*, is distinguished by the presence of recurrent, non-anastomosing, symmetrical cordons and four longitudinal symmetrical rows of body spines extending from the post-cordal cervical papillae to the tail; *Xenocordon*, proposed for *X. putanac* n.sp., is distinguished from *Cheilospirura* by the complex structure of the cordons and the shape of the female tail, and from *Synhimantus* by the cordon pattern and the presence of extra scales on the cordons. Other new species proposed are *Synhimantus* (*Dispharynx*) *podargi* from *Podargus strigoides*, S. (D.) *lichenostomi* from *Lichenostomus penicillatus*, S. (D.) *falco* from *Falco berigora* and *Phylidonyris novaehollandiae*.

The following species are recorded, with some redescription: *Synhimantus* (*Synhimantus*) *lateps* (Rud.) from *Ninox novaezeelandiae*; S. (S.) *sirry* Khalil syn. *Dispharynx pelecani* Johnston & Mawson from *Pelecanus conspicillatus*; *Syncuaria contorta* (Molin) from *Threskiornis aethiopica*; *Cheilospirura grueveli* (Gendré) from *Coturnix ypsilophora*.

Syncuaria sp. is recorded from *Podiceps cristatus*. Type material of *Synhimantus* (*Dispharynx*) *feldingi* (Baylis) has been examined and a figure of the anterior end is given.

The presence of two groups among species generally attributed to *Cheilospirura*, one of them with close resemblances to *Synhimantus* in the character of the deirids, detail of cordon structure, and shape of female tail, is noted and discussed.

KEY WORDS: Nematoda, Acuariinae, taxonomy, bird hosts, cordon structure.

Introduction

Examination of Acuariinae from birds dissected in the past 15 years has yielded some new species, two new genera and records of other species not hitherto known from Australian birds. Classification of the Acuariinae in the past depended largely on the pattern made by the cordons on the surface of the anterior end of the body. In the present work, it is proposed that the detail of the structure of the cordons may also be of taxonomic importance. The points noted below, in discussion of the cordons of *Cheilospirura* and *Synhimantus*, should be studied over a wider geographical range and in many more species, than has been possible in the present paper.

Materials and Methods

Holotypes and allotypes have been deposited in the South Australian Museum (SAM) and other material in the Australian Helminthological Collection (AHC), at present housed in the South Australian Museum.

The nomenclature of the bird hosts follows that adopted by the R.A.O.U. (Schodde *et al.*, 1978).

Measurements on the buccal capsule and parts of the oesophagus are taken from the anterior end of the worm to the posterior end of the organ concerned. The photomicrograph was taken by the E.T.E.C. Autoscan in the Central Electron Optical Laboratory of the University of Adelaide.

Syncuaria contorta (Molin, 1858)

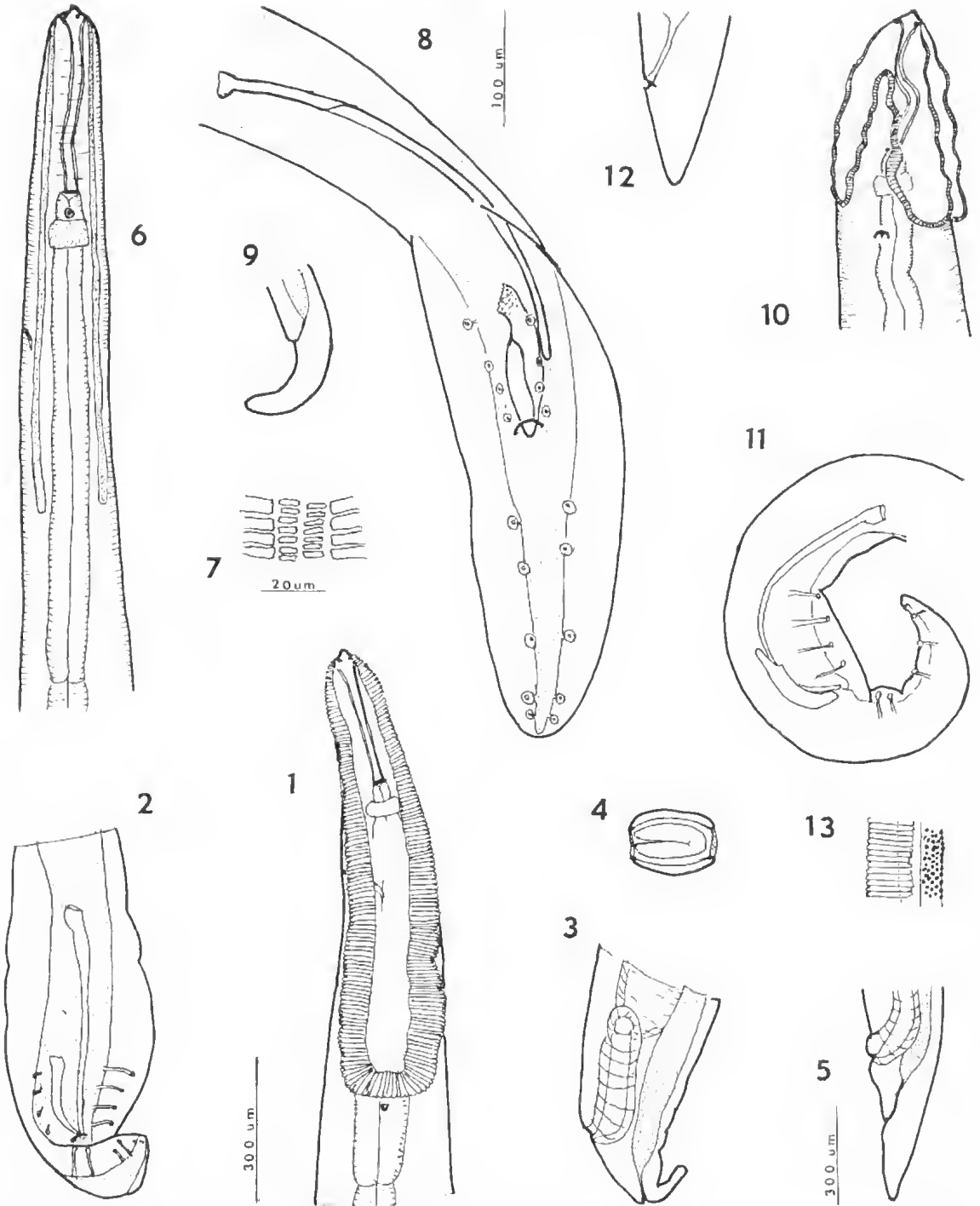
FIGS 1-4

Host and localities: *Threskiornis aethiopica* (Latham), from Blanchetown, Tailem Bend, and Robe, S. Aust. and from Victoria,

Measurements of the single male worm from Victoria are given in parentheses. Long slender worms 14.5-17.5 mm. Cordons wide, strongly striated, reaching to 550-660 (700) μm from head in male, 860-900 μm in female. Cervical papillae undivided, just posterior to cordons. Excretory pore at about midlength of cordon length. Buccal capsule 220-290 (190) μm in male, 270-290 μm in female. Distance of posterior end of muscular oesophagus from anterior end of body 900-970 (—) μm in male, 1070-1450 μm in female. End of glandular oesophagus not clear in any specimen.

Posterior end of male alate and twisted as in other species of the genus; four pairs precloacal and five pairs postcloacal pendunculate papillae

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Figs 1-4. *Syncuaria contorta*. 1, anterior end of male. 2, posterior end of male. 3, posterior end of female 4, egg.

Fig. 5. *Syncuaria* sp. from *Podiceps cristatus*, posterior end of female.

Figs 6-9. *Cheilospirura gruevi*. 6, anterior end of male. 7, part of cuticle, showing annuli and cordon structure. 8, posterior end of male. 9, tail of female.

Figs 10-13. *Synhimantus laticeps*. 10, anterior end of female. 11, posterior end of male. 12, tail of female. 13, part of a cordon.

Figs 1-3, 9-12 to same scale; figs 4 and 13 to same scale; figs 6 and 8 to same scale.

in alae, one pair sessile papillae ventrally near tip of tail. Left spicule 450–500 (450) μm long, proximal and slightly enlarged, 'hilt' about 150 μm long, tip bluntly pointed. Right spicule 180–190 (190) μm long, stoutly hilted and blunt tipped.

Body of female sharply flexed and markedly narrowed just behind anus, giving the appearance of terminal anus described by some authors. Tail 90–95 μm long, vulva 170–180 μm in front of anus. Uterus apparently single. Eggs 20–22 \times 25–30 μm , with very thick shells and flat polar plugs at each end.

In *Syncuaria* the only species for which a dorsally directed tail has been described are from ibis and spoonbills. The specimens described above differ from *S. diacantha* Petter 1961, from a spoonbill, chiefly in the spicule ratio. The two species from ibis, *S. contorta* (Molin, 1958) from Italy, and *S. calcarata* (Molin, 1860) from Brazil, are insufficiently described for proper comparison. From the figures given by Cram (1927) after Drasche, the proportions of *S. contorta* appear comparable with those of the Australian specimens. The cordons are wider than in Drasche's figure, but this is possibly a matter of interpretation.

Syncuaria sp.

FIG. 5

Host and locality: *Podiceps cristatus* L., from Canberra, A.C.T.

Only one female, with damaged anterior end, is present. It is 16.9 mm long. The anterior cuticle is broken, but the shape of the cordons shows that the species belongs to the genus *Syncuaria*. Cervical papillae undivided. Tail conical, 230 μm long; vulva 450 μm from tip of tail. Eggs 31–33 \times 20–22 μm ; thick-shelled polar openings present but not as obvious as in eggs of *S. contorta* described above.

S. decorata Cram 1927, and *S. longialula* Wang, 1976 have been described from *Podiceps* spp., but the single female present now cannot be properly compared with these.

Remarks on *Cheilospirura* and *Synhimantus*

Although according to the keys given by various authors, notably and most recently by Chabaud (1975), the genera of Acuariinae are clear and definite, in practice there are some difficulties in relying mainly on the pattern made by the cordons. Among the specimens described below, there are some which suggest that the distinction between genera (or at least, between sub-genera) may need to be

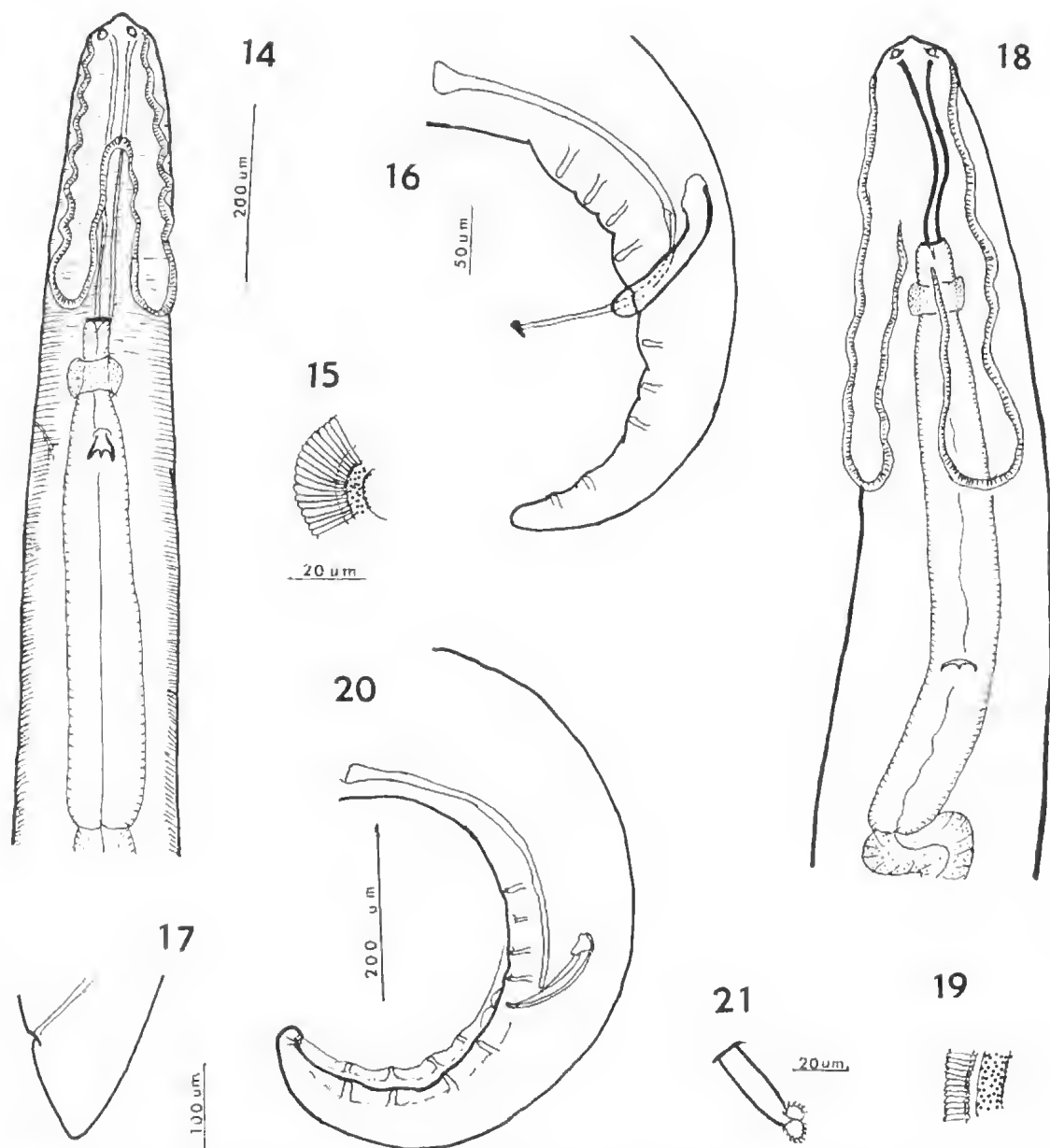
carried further, and may rest partly on the type of cordon: whether it is simple or complex in structure.

Cheilospirura gruveli (Gendre) identified and described below from an Australian phasianid bird, is the only species of this genus of which I have seen good specimens. *C. lamulosa* (Diesing, 1851), the type species, has only been identified in Australia once to my knowledge. Three females held by the Commonwealth Institute of Health (University of Sydney), identified by Baylis as *C. lamulosa*, are in too poor a condition for study of the cordons. However from a study of *C. gruveli* and of available literature on other species, it seems that *Cheilospirura* species are characterised by the cordon pattern, the simple structure of the cordons (as described below for *C. gruveli*), the digitiform tail of the female, the simple deirids lying at or in front of the nerve ring, the strongly annulate cuticle (in all these points similar to *Acuaria*), and by the unequal and dissimilar spicules.

In *Synhimantus* the deirids lie well behind the nerve ring, the tail of the female is conical, and the spicules are unequal and dissimilar. In all the species of *Synhimantus* seen by me, the cuticular annuli are distinctly closer together and less marked than those of *Cheilospirura gruveli*; in *S. (Dispharynx)* species annuli are absent from the anterior end of the body as far back as the cordons extend: in *S. (S.) laticeps* and *S. sirry* Khalil, the only species of the subgenus which I have seen, there are fine striae between the cordons.

The cordon structure in the *Synhimantus* species which I have seen differs markedly from that described above for *Cheilospirura*. The whole cordon is raised above the level of the rest of the body surface (Fig. 41). Each cordon consists of two longitudinal sections separated by a groove. Inglis (1965) points out that one of these sections arises from the outer surface of the pseudolabium, the other from the inner surface. The outer half-cordon is formed of a series of plates one behind the other, the inner half is mammillated, (Figs 13, 15, 19, 23, 28, 34, 41). The size of the plates and width of each half-cordon varies from species to species, but the basic structure is the same in all. The plates may partly overlies the groove.

There are several species at present assigned to *Cheilospirura* in which the tail is conical, and in these if the cordon structure is described or figured, it seems to be complex.



Figs 14-17, *Synhimantus (Synhimantus) sirry*. 14, anterior end of male. Fig. 15, part of cordon. 16, posterior end of male, 17, tail of female.

Figs 18-21, *Synhimantus (Dispharynx) podargi*. 18, anterior end of male. Fig. 19, part of a cordon. 20, posterior end of male. 21, tip of right spicule. Figs 14 and 18 to same scale; figs 15 and 19 to same scale.

Further study of these species may show that they should belong in another genus.

At present *Synhimantus* is composed of species of Acuariinae in which the cordons arise simply (i.e. without a loop), are recurrent, and in which there is no other cuticular

development such as spines, swellings, or folds. Two sub-genera have been proposed, (*Synhimantus*) for species in which the cordons anastomose, and (*Dispharynx*) for those in which they do not. However, there is some variation even among individuals of a species, as to the

extent to which the cordons are recurrent (e.g. *S. fulca* n.sp.), or to which anastomosis actually occurs (e.g. *S. sirry*, noted below).

It may be necessary to erect another subgenus of *Synhimantus*, to include species in which the cordons are not recurrent or anastomosing, but which in characters of cordon structure, deirids, and female tail agree with *Synhimantus*. Re-examination of *Cheilospirura fieldingi* (Johnston & Mawson, 1941) shows that the cordons are complex and the tail of the female is conical, not digitiform; it is suggested that other species which should be re-examined are *C. centrocerci* Simon 1939, *C. phalacrocoracis* Smogorzhevskaya 1966, and *C. serpentocephala* Gilbert 1913. *Xenocordon patonae* n.g., n.sp., described below, differs from *C. fieldingi* (sic) (and from *Synhimantus* spp.) in the detail of the cordon structure.

Cheilospirura gruveli (Gendre, 1913)

FIGS 6-9

Dispharagus gruveli Gendre, 1913, p. 106, from *Francolinus bicalcaratus* L., Dahomey.

Host and locality: *Coturnix ypsilophora* Bosc from Flinders I., Bass Strait.

Males 6.5-9.3 mm, females 19.6-21.6 mm in length. Cuticle coarsely annulated throughout body length. Cordons 440-740 μm long in male, 1040-1100 μm in female, reaching at least to mid length of, and in some cases just posterior to, the muscular oesophagus. Each cordon consists of two longitudinal rows of plates, each pair of plates are alike, and roughly, but by no means exactly, correspond to the adjacent cuticular annulus (Fig. 7). The cordon itself is not raised above the level of the adjacent cuticle. This type of cordon is also present in *Acuaria* spp. (Gendre, 1912; Williams, 1929; Mawson, 1972); from information given in descriptions of figures, it appears to be present in *Cheilospirura gallinae* Sultanov, 1961, *C. rotundata* (Linstow, 1907).

Buccal capsule length 160-190 μm in male, 200-240 μm in female.

Distance from anterior end of cervical papillae 180-220 μm (σ), 220-250 μm (f); of excretory pore 290-340 μm (σ), 420-450 μm (f); of nerve ring 195-250 μm (σ), 150-270 μm (f).

Posterior end of male twisted, with wide caudal alae. Number and arrangement of papillae on male tail shown in Fig. 8. Left spicule blunt tipped, 450-510 μm long, right spicule 150-160 μm long, its sides turned in to form a gutter. Spicule ratio 3.1-3.4.

Female with digitiform tail 190-200 μm long. Vulva in front of midlength, 38-49% of body length from the head. Eggs 41-42 \times 20 μm .

These specimens resemble *A. coturnicola* Semenov, 1926 and *A. gruveli* Gendre, 1913; from the published measurements and descriptions there is little to differentiate these two species, especially as there appears to be no record of the female of *A. coturnicola*. The new specimens have been identified as *C. gruveli* as this species has priority. However, the tail of the female differs very slightly from that drawn by Gendre, and the eggs are longer. I have relied on Cram (1926) for a description of this species, as Gendre's paper is unobtainable in Australian libraries.

Synhimantus (Synhimantus) laticeps
(Rudolphi, 1819)

FIGS 10-13

Host and locality: *Ninox novaeseelandiae* Vigors & Horsfield, from Adelaide, S. Aust.

The morphology and proportions of these specimens agrees with those described for *Synhimantus laticeps*, which has not until now been recorded from Australian birds.

Material consists of one male, 8.1 mm long, and one female, 10.6 mm. The measurements of male and female respectively are: cordon length 330, 400 μm ; buccal capsule 180, 290 μm ; muscular oesophagus 800, 1100 μm ; entire oesophagus 4.1, 3 mm; anterior end to nerve ring 250, 350 μm ; to trifid cervical papillae 420, 450 μm ; to excretory pore 330, 350 μm ; length of tail 350, 200 μm ; of left spicule 600 μm , of right spicule 180 μm . Vulva 5.9 mm from head, about 55% of body length; eggs 40 \times 25 μm .

In these specimens as in the figure of the head by Schneider (reproduced by Cram 1927, p. 276, fig. 341) there are fine cuticular striae between the cordons. The cordon structure (Fig. 13) is similar to that described above for *Synhimantus (Dispharynx) spp.*

Synhimantus (Synhimantus) sirry Khalil, 1931

FIGS 14-17

Synhimantus sirry Khalil, 1931, p. 455, from *Pelecanus onacrotalus*, Egypt.

Dispharynx pelecani Johnston & Mawson, 1942, p. 185, from *P. conspicillatus*, S. Aust. Host and localities. *Pelecanus conspicillatus* Temminck, from Queensland, and Victoria.

The new specimens which agree otherwise with the description of *Dispharynx pelecani*,

vary as to the state of the cordons. In some the cordons unite completely, in others the recurrent branches remain distinctly separate, and in some the tips of the two recurrent branches approach each other but do not actually touch. It seems that there must be some other criterion or criteria on which to distinguish (*Synhimantus*) and (*Dispharynx*). The only difference noted during this study is that there are fine cuticular striae between the cordons in (*Synhimantus*) spp., but these are not present in (*Dispharynx*). These are present in material from Australian pelicans.

In essentials, *D. pelecani* is close to *S. sirryi*; the only difference is that the barb, present on the tip of the left spicule, was not described for *S. sirryi*, but as the spicule is inside the body in the only male of *S. sirryi*, it could easily have been overlooked. In the light of the new material, with its variable cordons, it appears that *D. pelecani* is a junior synonym of *S. sirryi*.

The species is characterised by a long buccal capsule, cordons reaching hardly further than the nerve ring, with recurrent branches, anastomosing or not, one third to one half the cordon length; large tricuspid or bicuspid cervical papillae lying well behind the cordon in some cases at midlength of muscular oesophagus; left spicule 270–410 μm long, with barbed tip, right spicule 100–160 μm , and spicule ratio 2.5 to 3.3; vulva 56–60% body length from head; eggs $37 \times 25 \mu\text{m}$ (Khalil), $36 \times 21 \mu\text{m}$ (Johnston & Mawson), $39 \times 21 \mu\text{m}$ (present material).

***Synhimantus (Dispharynx) podargi* n.sp.**

FIGS 18–21

Host and localities: *Podargus strigoides* (Latham) from Callington (type locality) and Adelaide, S. Aust.

Holotype male, S.A.M. V3067.

Short worms, males only present, 7.0–9.3 mm long, with tail in single coil. Cordons reach 450–700 μm from anterior end, recurrent a third to a half their length. Trifid cervical papillae 600–1000 μm and excretory pore 350–690 μm from anterior end. Buccal

capsule 180–250 μm long. Muscular oesophagus ends 810–1100 μm , and glandular oesophagus 2.8–3.8 mm, from anterior end of body.

Tail 420–450 μm long, with narrow alae. Four pairs of precloacal and five pairs of postcloacal pedunculated papillae, fifth postcloacal very short, and pair of sessile papillae between this last pair. Left spicule slender, 600–630 μm long, its tip slightly enlarged and divided into two spoonlike plates, fringed around free edges. Right spicule 190–210 μm long, broad with rounded tip. Spicule ratio 2.8–3.2 μm . Cuticle just behind, and for some distance in front of, cloaca ridged longitudinally.

This species lies close to a group in which the cordons are shorter than the muscular oesophagus but extend well past the nerve ring, the tip of the left spicule is simple, the spicule ratio is less than 4.5, and the cervical papillae lie behind the cordons. These species all come from birds of prey, (including owls and nightjars) and appear to be distinguishable mainly by the length of the left spicule. In *S. podargi* this length is 600–630 μm , longer than that of *S. (D.) noctuae* (Seurat, 1913) (260 μm), *S. (D.) capitata* (Molin, 1860) sensu Yamaguti, 1935 (450 μm) (not Skrjabin, Sobolev & Ivashkin, 1965), and *S. (D.) notoi* (Smith, 1927) (335 μm) but shorter than that of *S. (D.) ketupae* (Sanwal, 1951) (830 μm) and *S. (D.) indicus* (Rasheed, 1960) (950–1000 μm). *S. (D.) podargi* is distinguished from these species also by the plates at the tip of the left spicule.

***Synhimantus (Dispharynx) falco* n.sp.**

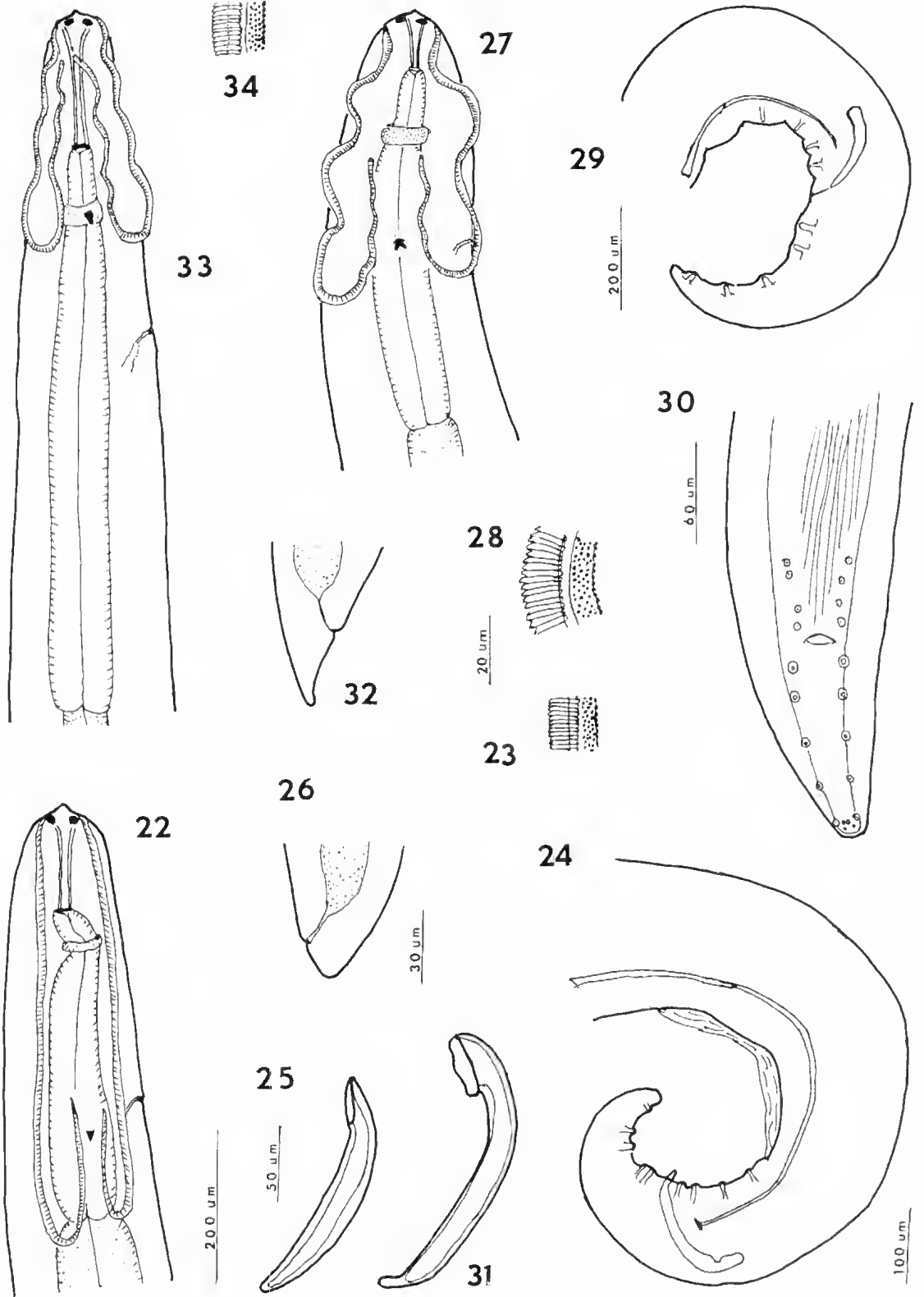
FIGS 22–26

Hosts and localities: *Falco venchroides* Vigors & Horsfield (type host) from Pt Turton, S. Aust.; *F. berilgora* Vigors & Horsfield, from Blanchetown, S. Aust.; *Phylidonyris novaehollandiae* (Latham) from near Goolwa, S. Aust.

Holotype σ SAM V3070. Allotype f SAM V3071.

The specimens from *Phylidonyris* (a honey-eater) are in poor condition, the cuticle being

Figs 22–26, *Synhimantus (Dispharynx) falco*. 22, anterior end of male. 23, part of a cordon. 24, posterior end of male. 25, right spicule. 26, posterior end of female.
Figs 27–32, *Synhimantus (D.) lichenostomi*. 27, anterior end of female. 28, part of a cordon. 29, and 30, lateral and ventral views of posterior end of male. 31, right spicule. 32, tail of female.
Figs 33–34, *Synhimantus (D.) fieldingi*. 33, anterior end of male, drawn from paratype material. 34, part of a cordon. Figs 22 and 33 to same scale; figs 23, 28 and 34 to same scale; figs 25 and 31 to same scale; figs 27, 29 and 32 to same scale.



relaxed and easily broken; this state has the appearance of being due to postmortem changes, as all specimens are well developed, and the females full of firmly-shelled embryonated eggs. Measurements of these specimens are given in brackets after those of type specimens.

Length of males 5.0–6.5 (7.7–7.9) mm, of females 6.2–7.2 (10.6) mm; cordons almost straight to posterior loop, extending 550–630 (500–600) μm in the males and 750–900 (950) μm in females from anterior end, recurrent part varying in length from barely perceptible to 200 μm . Excretory pore and cervical papillae at almost same level, at distance from anterior end of 420–560 μm in male and 600–700 μm in female. Cervical papillae hook-like in profile but have two small, lateral cusps. Buccal capsule 140–150 (130–170) μm in male, 160–200 (180) μm in female; most twisted in some degree, some too much for accurate measurement.

Muscular oesophagus reaches about level of cordons in males, shorter than cordons in females, its length 500–610 (640) μm in males, 500–800 (730) μm in females. Total length of oesophagus 2300–3300 μm in males, 2400–3200 μm in females, about $\frac{1}{2}$ or $\frac{2}{3}$ body length.

Male: Caudal alae not well developed; ventral cuticle in preanal region somewhat inflated and marked with short longitudinal striae. Four pairs pedunculated papillae preanally, and five pairs postanally arranged as shown in Fig. 20, as well as one pair sessile papillae and a pair of phasmids at about level of most posterior pedunculate papilla. Left spicule 680–800 (760–850) μm long, of which about $\frac{1}{3}$ is hilt; tip of spicule with dorsally directed barb. Right spicule 190–210 (230–300) μm long, its terminal 20 μm narrowed but not twisted. Spicule ratio 3.4–4.0 (3.3–2.8) Tail length 180–200 (200) μm .

Female: Tail rounded, anus about 20–30 μm from apex. Vulva 1.7–2.1 mm, or 25–30% of body length from posterior end. Embryonated eggs 35 μm \times 25–27 μm .

The terminal barb of the left spicule is quite distinct even when not protruding outside the body. Other species for which such a barb has been described are *S. sirryi* Khalil, 1931 (see above) in which the buccal capsule is almost as long as the cordons, and *S. skrjabini* Rasheed, 1960, in which the vulva is very close to the anus. The only other species of this subgenus described from Australian birds

of prey is *S. (D.) fieldingi* Baylis, 1934, in which the spicule is without a barb, the buccal capsule is shorter and the muscular oesophagus longer in relation to the cordon length than in the species described here. The specimens from *Phylidonyris* are longer and the spicules slightly longer, but in details of the male tail and of the anterior end, there appears to be no doubt of their being the same species.

Synhimantus (Dispharynx) lichenostomi n.sp.

FIGS 27–32

Hosts and localities: *Lichenostomus penicillatus* (Gould) from St Peters S. Aust. Holotype ♂ SAM V3068, Allotype ♀ SAM V3069. *Meliphaga lewinii* (Swainson) from Brisbane, Qld (1♀).

These are relatively small worms, the males slightly longer than the females, more slender, and with the posterior end in about two coils. Length of males 7.7–8.5 mm, of females 7.1–8.0 mm. Female from *L. lewinii*, 5.0 mm long, is packed with unfertilised eggs, and measurements of this female are given in brackets after those of other females.

Cuticle finely annulate behind cordons. Cordons wavy, reaching a little more than $\frac{1}{2}$ distance from head to end of muscular oesophagus, and four to five times length of buccal capsule. Recurrent part of cordons about $\frac{2}{3}$ the descending parts.

Cordon length in male 460–480 μm , in females 330–600 (530) μm , recurrent part 220–300 μm in males, 250–350 (200) μm in females. Excretory pore and bifid cervical papillae at same level 400–410 μm in males, 450–500 (340) μm in females, from anterior end of body.

Buccal capsule 100–110 μm long in males, 100–120 (100) μm in females. Length of muscular oesophagus 650–810 μm in males, 800–900 (610) μm in females. Total length of oesophagus 200–3100 μm in males, but not noted in females as posterior end obscured by eggs. Muscular part of oesophagus 650–810 μm in males, 800–900 (610) μm in females. Distance from head of nerve ring 250–300 μm in males, 320 (260) μm in females.

Male: Coiled posterior end of body includes all the postoesophageal region. Ventral surface of posterior 1 mm of body, in front of cloaca, thickened into longitudinal ridges. Cuticle around tail and immediately anterior to cloaca inflated. Four pairs pedunculate papillae preanally, and five pairs postanally, as well as one pair of sessile papillae near tip of tail between

fifth pair of pedunculated papillae, and behind these a pair of phasnids. Left spicule 430–450 μm long, with hilt 130–160 μm , and with simple tip; right spicule 140–180 μm long, with slightly narrowed blunt tip. Spicule ratio 2.5–3.2. Tail length 420–480 μm .

Female: Tail 130–170 (120) μm long, more or less conical in shape, with blunt tip. Vulva posterior, at 64–76% of body length from anterior end. Eggs 39–41 \times 20 μm .

These specimens belong to a group of (*Dispharynx*) in which the body is short, the female tail more or less conical, the male tail coiled, and the buccal capsule short in relation to lengths of cordons and muscular oesophagus and to head width. The species in this group are (*D.*) *nasuta* (Rud. 1819), (*D.*) *pavonis*, Sarwal, 1951, (*D.*) *emberizae* Yamaguti, 1935, (*D.*) *pipilonis* Olsen, 1939, and (*D.*) *stonae* Harwood, 1933. The differences between these species are small, resting on spicule lengths, shape of right spicules, and number and arrangement of caudal papillae in the male. However, without re-examination of the types these differences cannot be properly compared. There is also a wide geographical and host variation. Our specimens are therefore proposed as a new species.

Synhimantus (*Dispharynx*) *fieldingi* (Baylis)

FIGS 33–34

syn. *Acuaria* (*Dispharynx*) *fieldingi* Baylis, 1934, p. 144. From *Accipiter novaehollandiae*, Queensland.

Cotypes of this species were deposited by Baylis in what is now the Commonwealth Institute of Health in the University of Sydney. These have recently been examined for comparison with *Synhimantus* (*Dispharynx*) *falco* n.sp., described below. It is unnecessary to amend the description given by Baylis except to iterate that the tip of the left spicule, though slightly curved dorsally, does not have a barb as seen in that of *S. falco*, and in some other species. A figure of the anterior end of the one of the specimens is given. The cordon structure and cuticular annuli are typical of the subgenus.

***Xenocordon* n.g.**

Acuariinae: Cordons not anastomosing, not recurrent, cordon structure complex, with scales over inner section of each cordon; cervical papillae well behind nerve ring; Male: four pairs preloacal and five pairs postloacal papillae in caudal alae; left spicule longer than right, tip slender; right spicule stout with

rounded tip; Female: tail conical, vulva at about $\frac{1}{2}$ body length from head. Parasitic in gizzard of Australian birds. Type species *Xenocordon patonae*, n.sp.

Xenocordon is close to *Synhimantus*, from which it is distinguished by the pattern of the cordons and the detail of the cordon structure.

A species to be described by G. de Chaneet (in preparation) from Australian magpies (*Cracticidae*) also belongs to this genus (Fig. 41). *Chellosphura flindersi* Johnston & Mawson, which was mentioned above as a variation of *Synhimantus*, as the cordons are straight, is not referred to *Xenocordon* because of the detail of the cordon structure.

***Xenocordon patonae* n.g. n.sp.**

FIGS 35–38

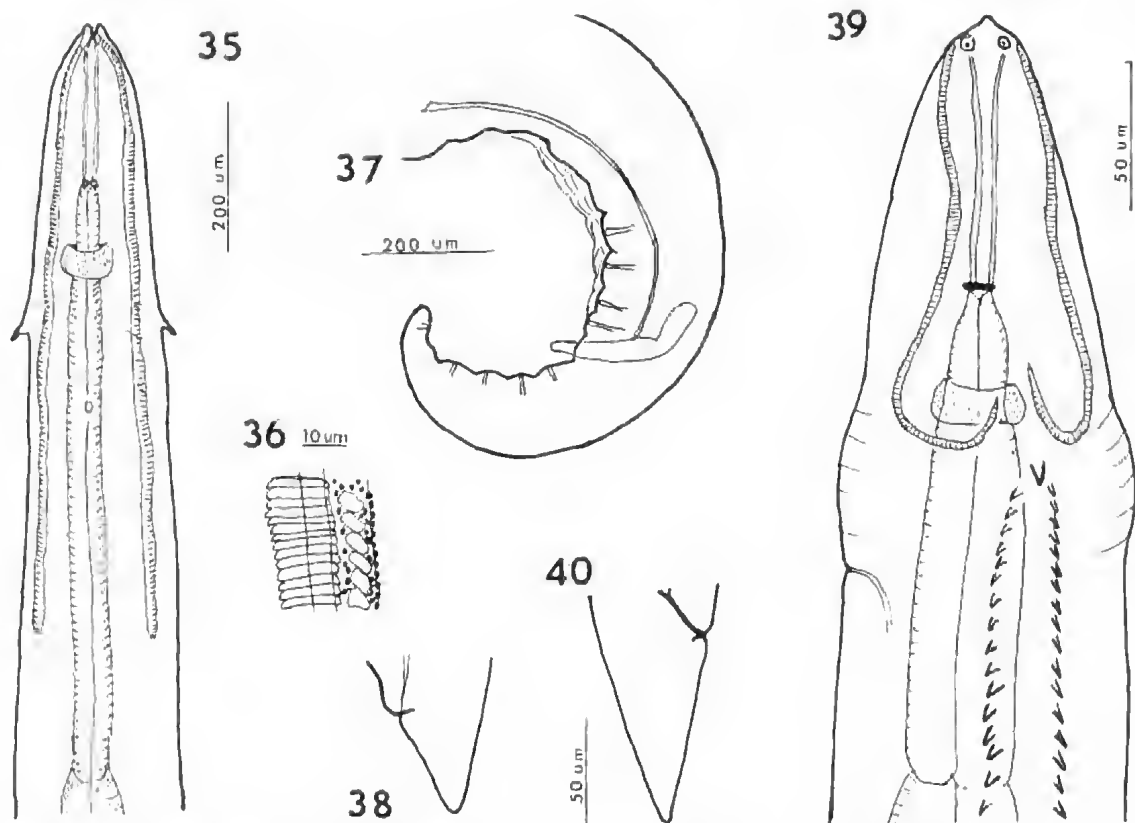
Host and locality: *Phylidonyris novaehollandiae* (Latham) from near Goolwa, S. Aust. Holotype σ SAM V3065, Allotype f SAM V3066.

Only one male 8.6 mm long and one female 14.4 mm long of this species are present. Cordons, 800 μm long in male, 1400 μm in female, not recurrent or anastomosing. Internal half of cordon mammillated, partly overlain by series of thin oval scales, arranged in a regular longitudinal row, external half with series of wide, short, plates (Fig. 36). Cuticle of anterior part of body, in region of cordons, not annulated, cuticle behind cordons finely annulated.

Cervical papillae bifid, 400 μm (σ) and 690 μm (f) from anterior end. Excretory pore shortly behind these. Length of buccal capsule 200 μm (σ), 300 μm (f), of muscular oesophagus 1000 μm (σ), 1900 μm (f), and of glandular oesophagus 2600 μm (σ), 4300 μm (f).

Left spicule 1000 μm long, its tip simple; right spicule 250 μm long, and spicule ratio 4. Caudal alae with four pairs of preloacal and five pairs postloacal papillae; preloacal ventral cuticle raised in broken ridges. Female with conical tail 200 μm long; vulva 70% of body length from head. Eggs numerous, about 40 \times 20 μm .

These two specimens were taken from the same host individual as those identified above as *Synhimantus* (*Dispharynx*) *falco* n.sp. They differ distinctly from *S. falco*, not only in the nonrecurrent form of the cordons, and their detailed structure, but also in the length of the buccal capsule, the shape of the muscular oesophagus (Figs 22, 35), the position of the



Figs 35-38, *Xenocordon patonae*. 35, anterior end of male, ventral view. 36, part of one cordon, with lateral aspect to right of figure. 37, posterior end of male. 38, tail of female.

Figs 39-40, *Willmottia australis*. 39, anterior end of female. 40, tail of female. Figs 36 and 37 to same scale.

cervical papillae and excretory pore, the absence of a barb on the tip of the left spicule, and the shape of the tail of the female (Figs 26, 38).

Willmottia n.g.

Acuariinae: Short worms, cordon symmetrical recurrent, not anastomosing, two pairs of rows of sublateral hooks on each side of the body, from cervical papillae to tail; vulva at about two-thirds body length from posterior end. Male unknown. Parasitic in birds. Named for Dr Sheila Willmott. Type species: *Willmottia australis* n.sp.

Willmottia is perhaps closest to *Echinuria* in the presence of longitudinal rows of hooks on the body, but differs from this genus in that the cordons are recurrent and do not anastomose, and both hooks and cordons are symmetrically arranged. It differs from *Chordonocephalus* in the absence of anastomosis, in the nature of the lateral "hooks", and in the more forward position of the vulva.

Willmottia australis n.g., n.sp.

FIGS 39, 40

Host and locality: *Malurus cyaneus* Latham, from Lilydale, Tas. Holotype female SAM V3072, 2♀ in A.H.C.

Short straight worms, 1600-1700 µm long, widening to posterior quarter of body length, narrowing suddenly just anterior to anus, ending in short conical tail. Body slightly widened by ring of thickened cuticle at level of cervical papillae, just below ends of cordons.

Cordons extend 130-150 µm from anterior end, with recurrent ends 20-30 µm, not anastomosing. Cervical papillae digitiform, 160-165 µm from head. Two rows of hooks on each side of body extend from level of cervical papillae to tail. Excretory pore 190-195 µm from head.

Buccal capsule with striated walls, 90-110 µm long. Muscular part of oesophagus 250-280 µm long, glandular part ends 820-1000 µm from anterior end. Nerve ring

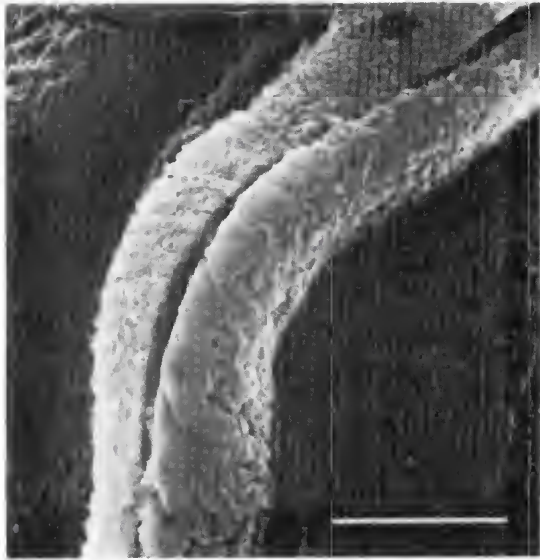


Fig. 41, photomicrograph of *Xenocordon* sp. from a magpie, *Gymnorhina tibicen*, from South Australia. The part of the cordon derived from the internal surface of the pseudolabium is to the right, and is overlain by the scales typical of the genus. Scale bar = 10 μ m.

130–150 μ m from anterior end. Tail end 75 μ m long, conical with rounded tip. Vulva at 66–75% of body length from anterior end. There appears to be only uterus, the vagina extending backward from the vulva a short distance, and the uterus then forward. No shelled eggs are present in any of the females.

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